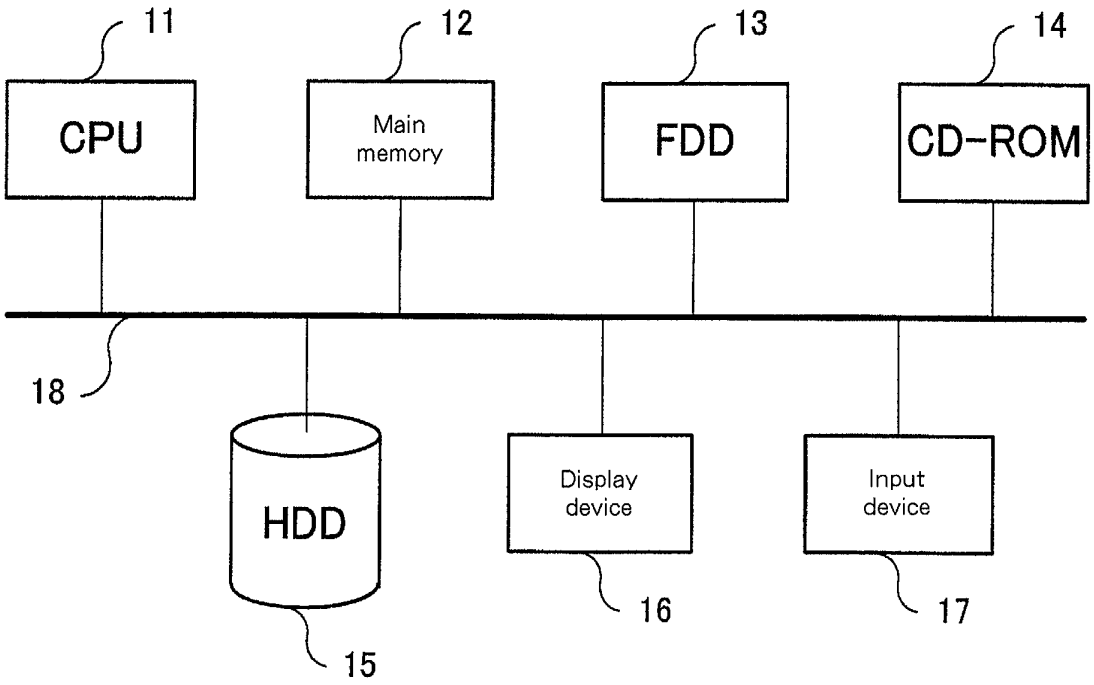

11
12
13
14
CPU
Main memory
FDD
CD-ROM
18
HDD
Display device
Input device
16
17
15

Fig. 1

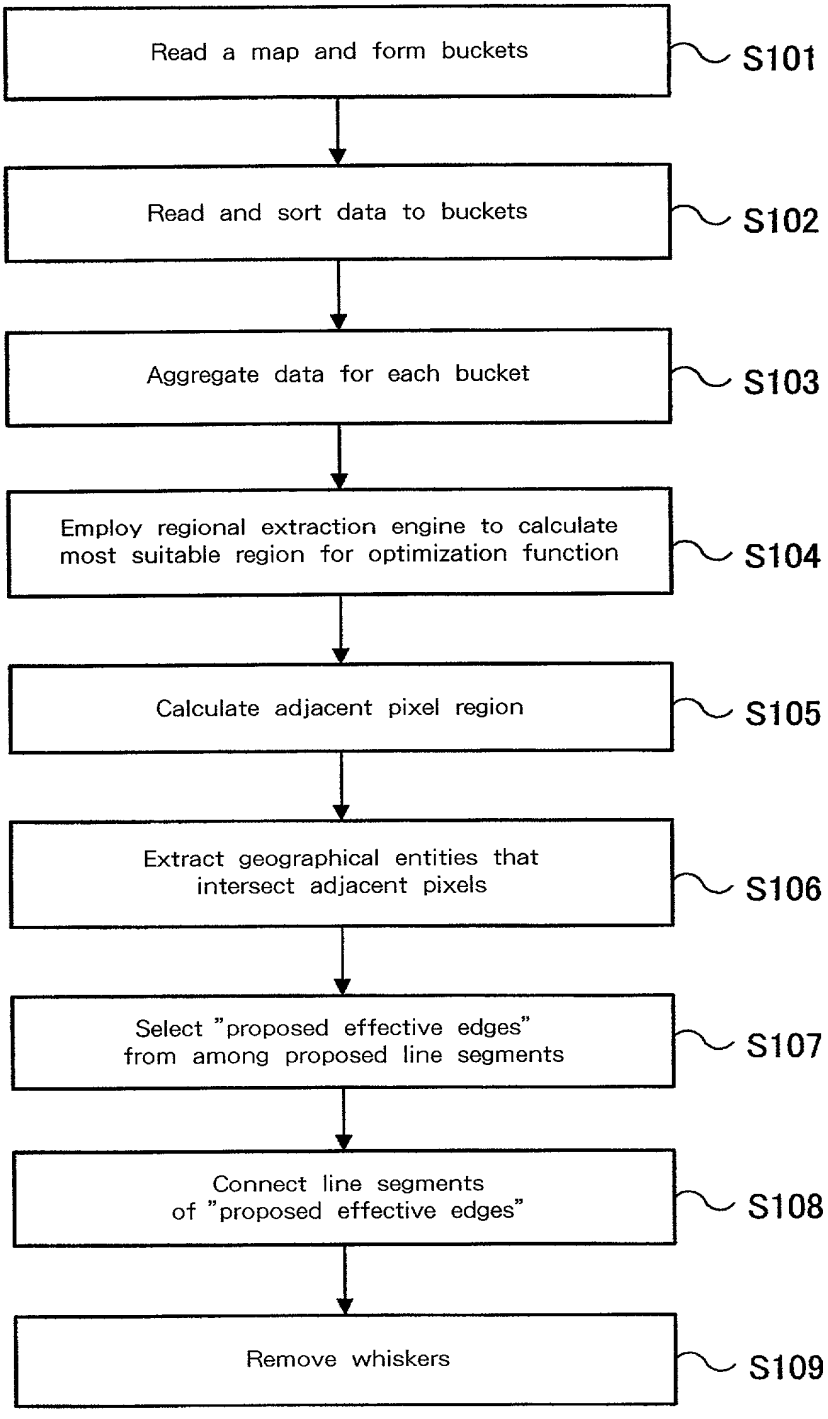

Read a map and form buckets
S101
Read and sort data to buckets
S102
Aggregate data for each bucket
S103
Employ regional extraction engine to calculate most suitable region for optimization function
S104
Calculate adjacent pixel region
S105
Extract geographical entities that intersect adjacent pixels
S106
Select "proposed effective edges" from among proposed line segments
S107
Connect line segments of "proposed effective edges"
S108
Remove whiskers
S109

Fig. 2

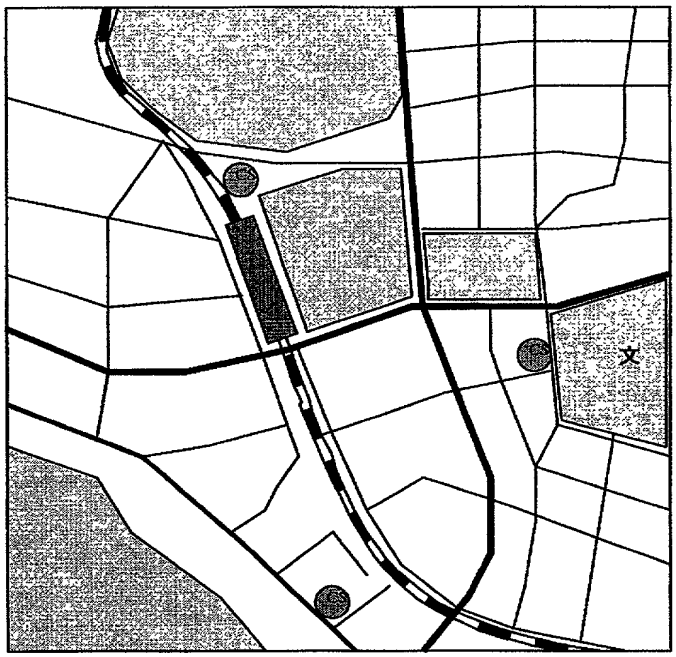
(a) Customer database for specific department store

Customer ID	Name	Address X , Y	Sales value	Annual income
101	ichiro	100 , 150	126,800	5,000,000
102	jiro	220 , 180	198,000	7,000,000
103	saburo	420 , 500	15,000	5,800,000
⋮	⋮	⋮	⋮	⋮

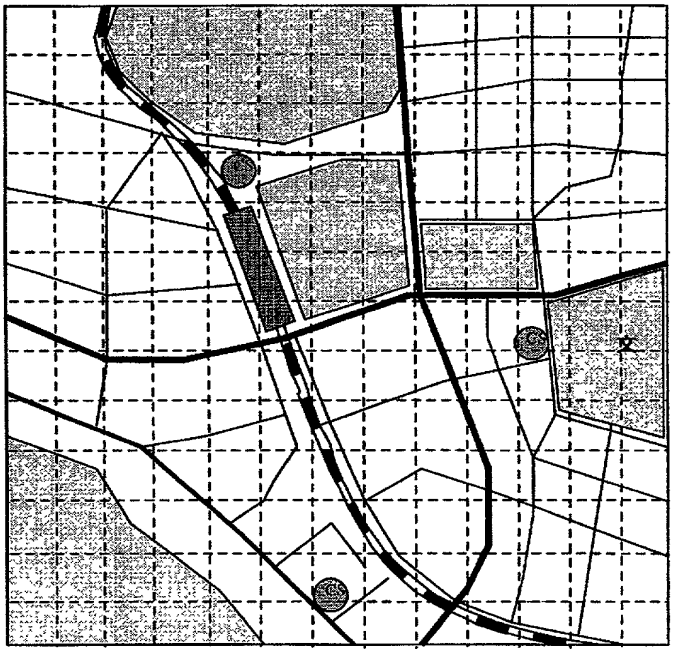
(b) Limitation, objective function for optimization of region

Limitation :	Objective function :
Maximum grid count	Sum of sales value
Minimum customer count	Average annual income

Fig. 3

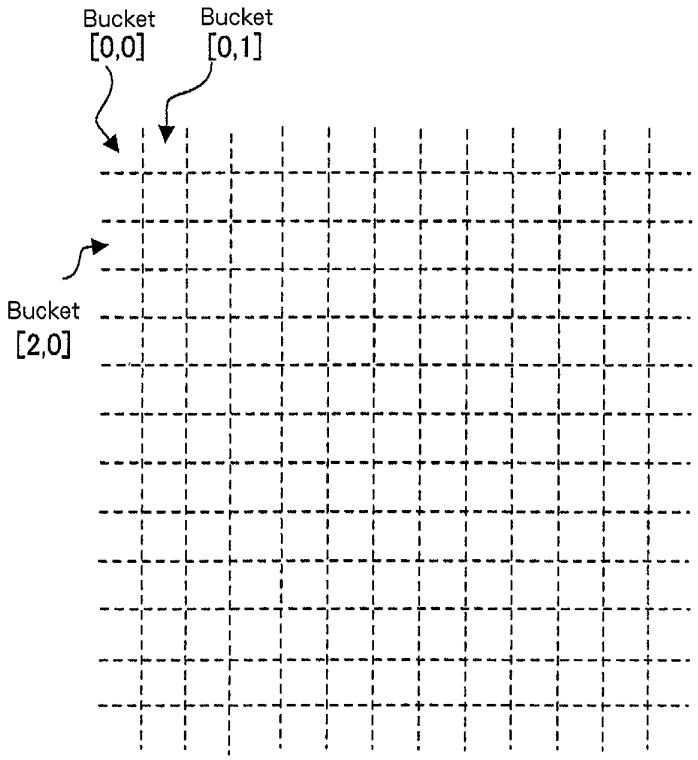


(a) Map



(b) Map buckets

Fig. 4



Bucket	Customer count (record count)	Sum of annual incomes
[0,0]	297	463020900
[0,1]	302	528181000
...		
[2,0]	159	201193400
...		

Fig. 5

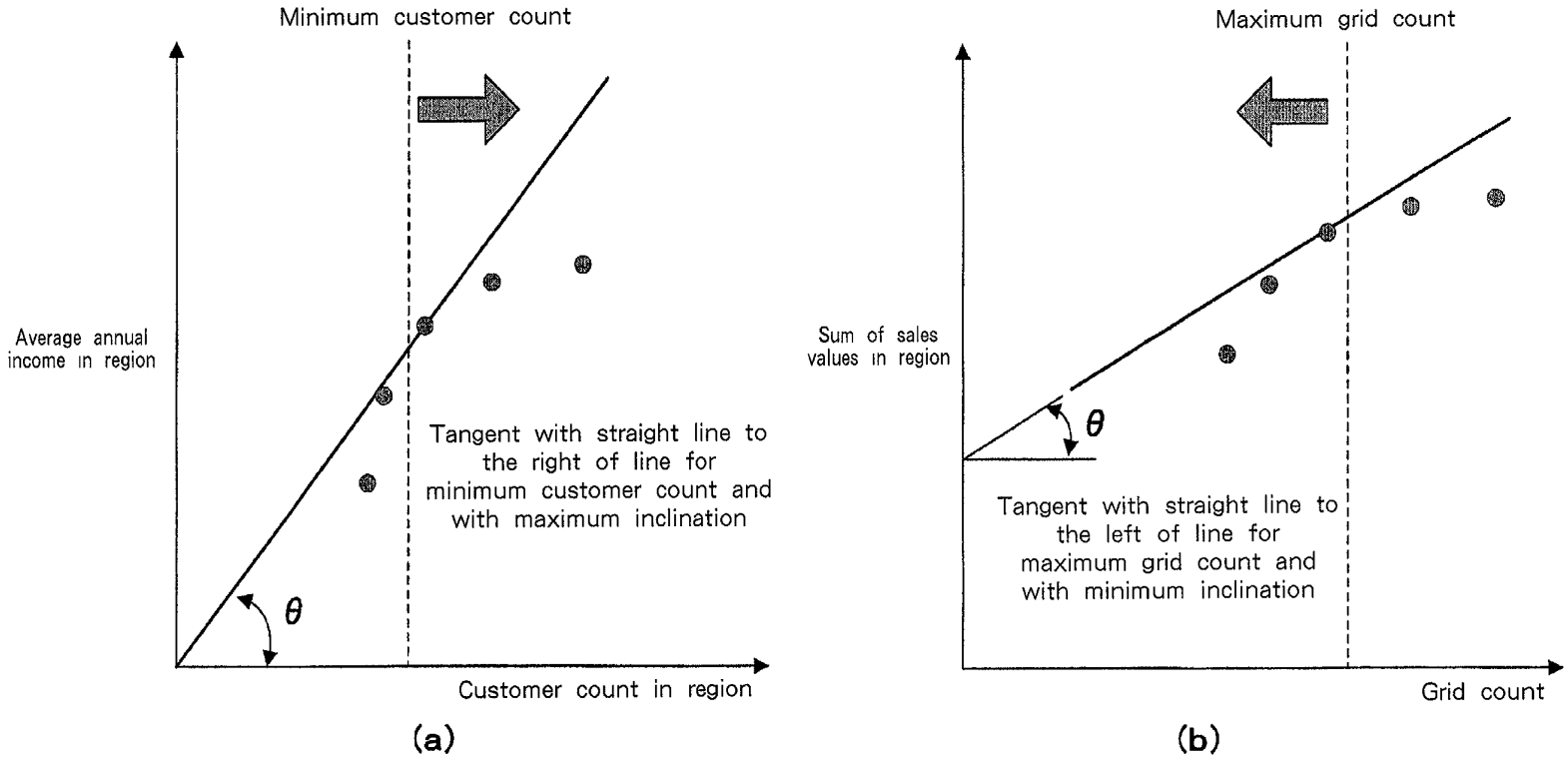

Minimum customer count
Average annual income in region
Tangent with straight line to the right of line for minimum customer count and with maximum inclination
θ
Customer count in region
(a)
Maximum grid count
Sum of sales values in region
θ
Tangent with straight line to the left of line for maximum grid count and with minimum inclination
Grid count
(b)

Fig. 6

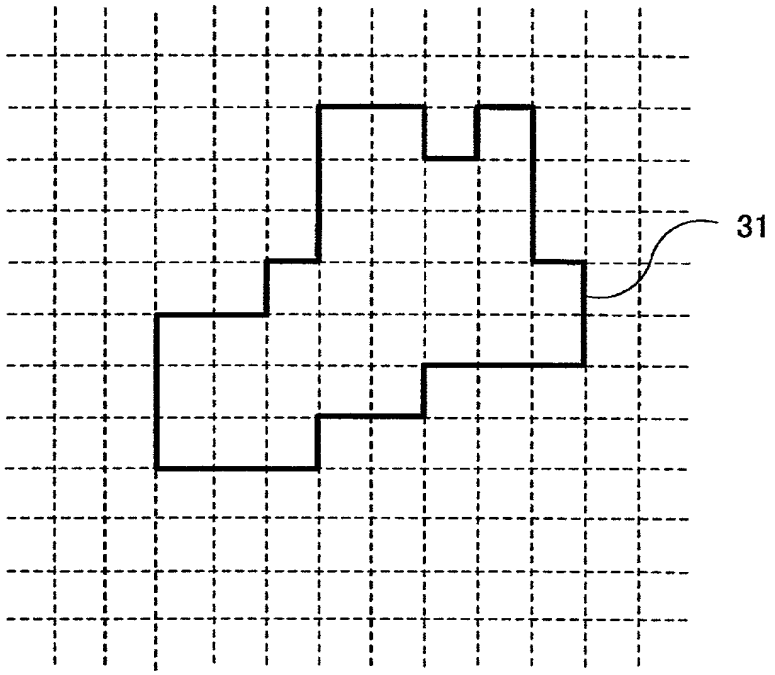


Fig. 7

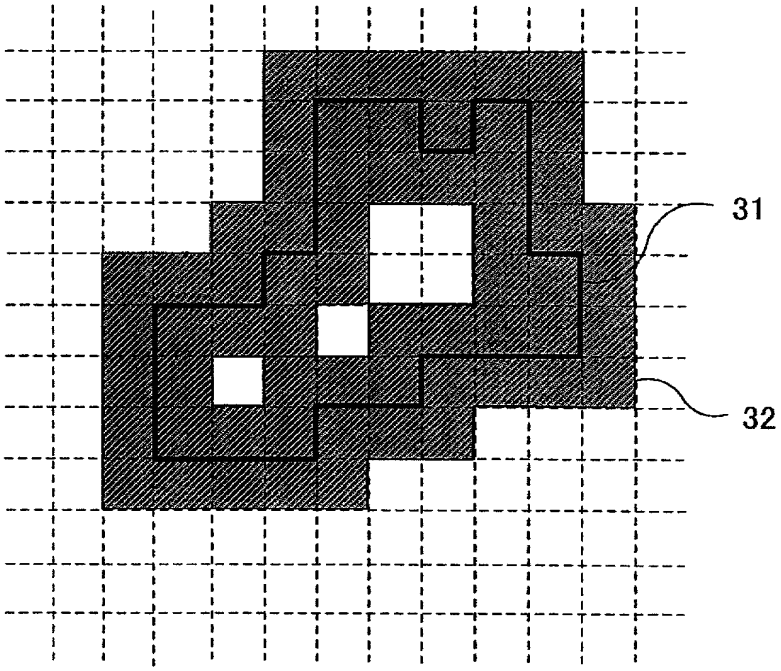


Fig. 8

EPO/JPO - 05/04/2000

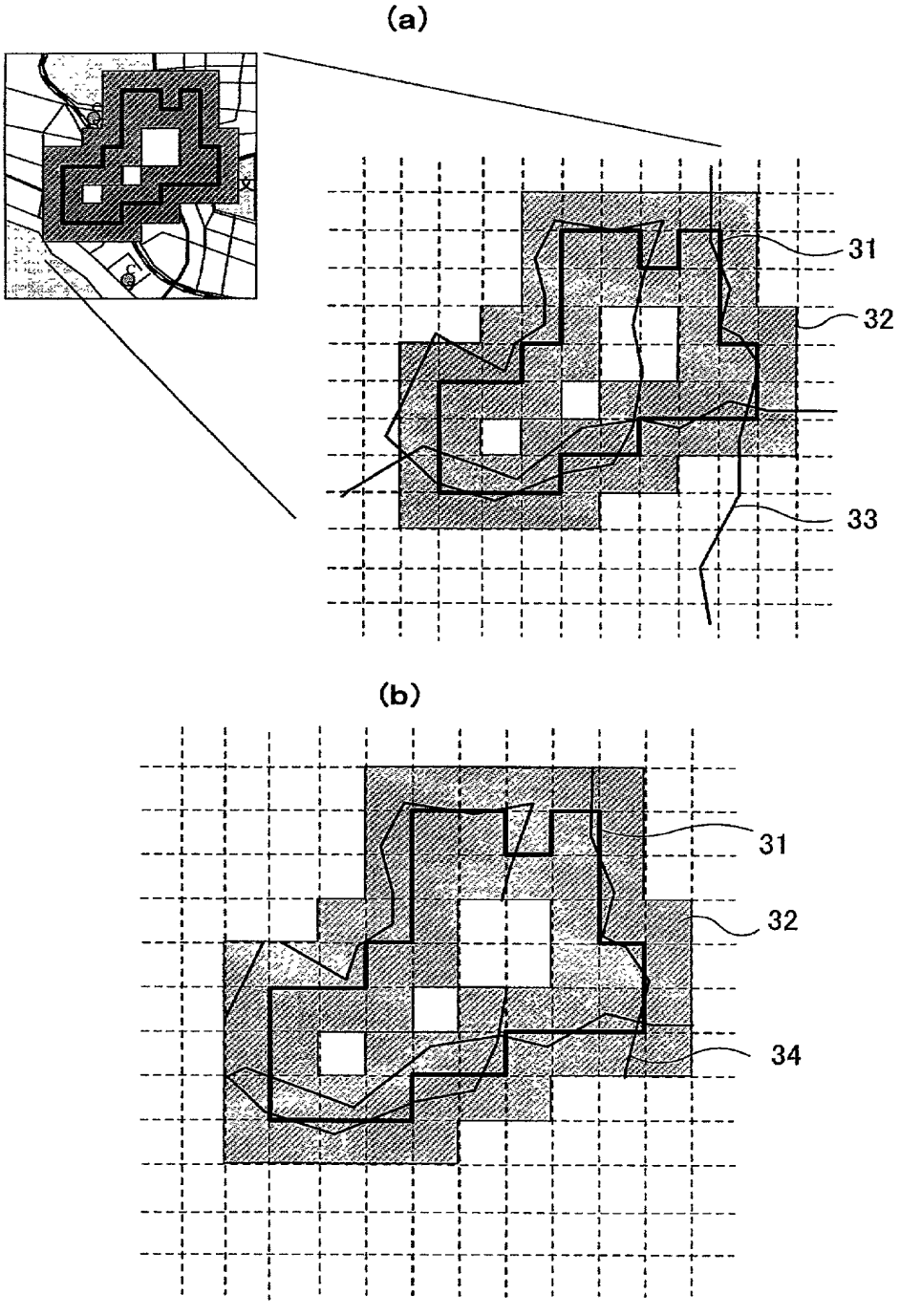


Fig. 9

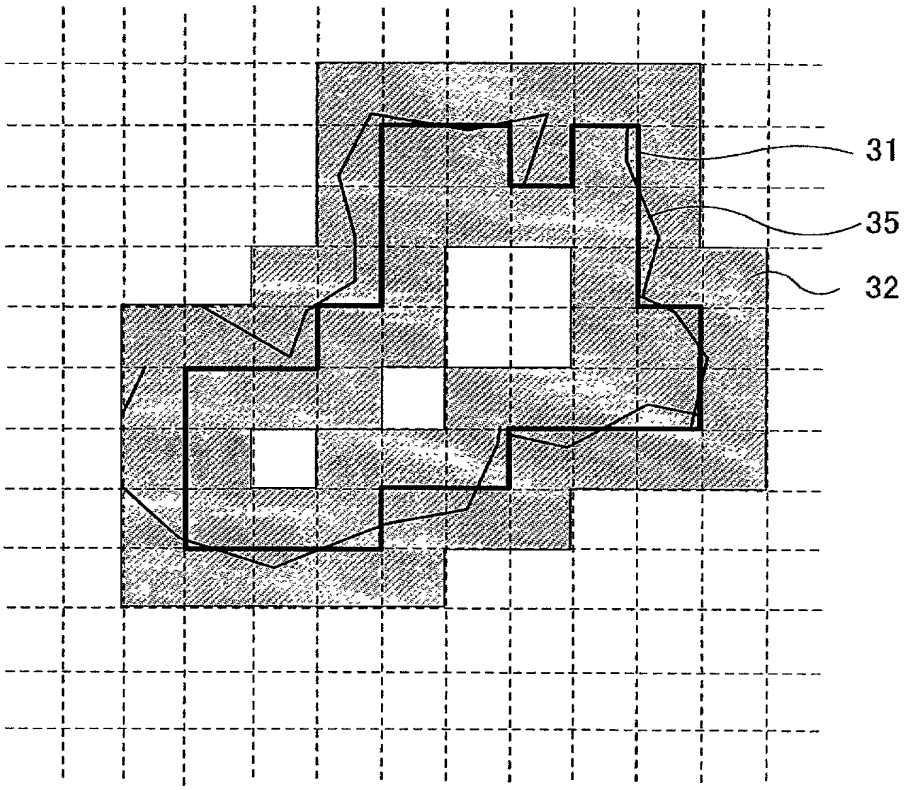


Fig. 10

EPO - DG 2 - 09.12.99

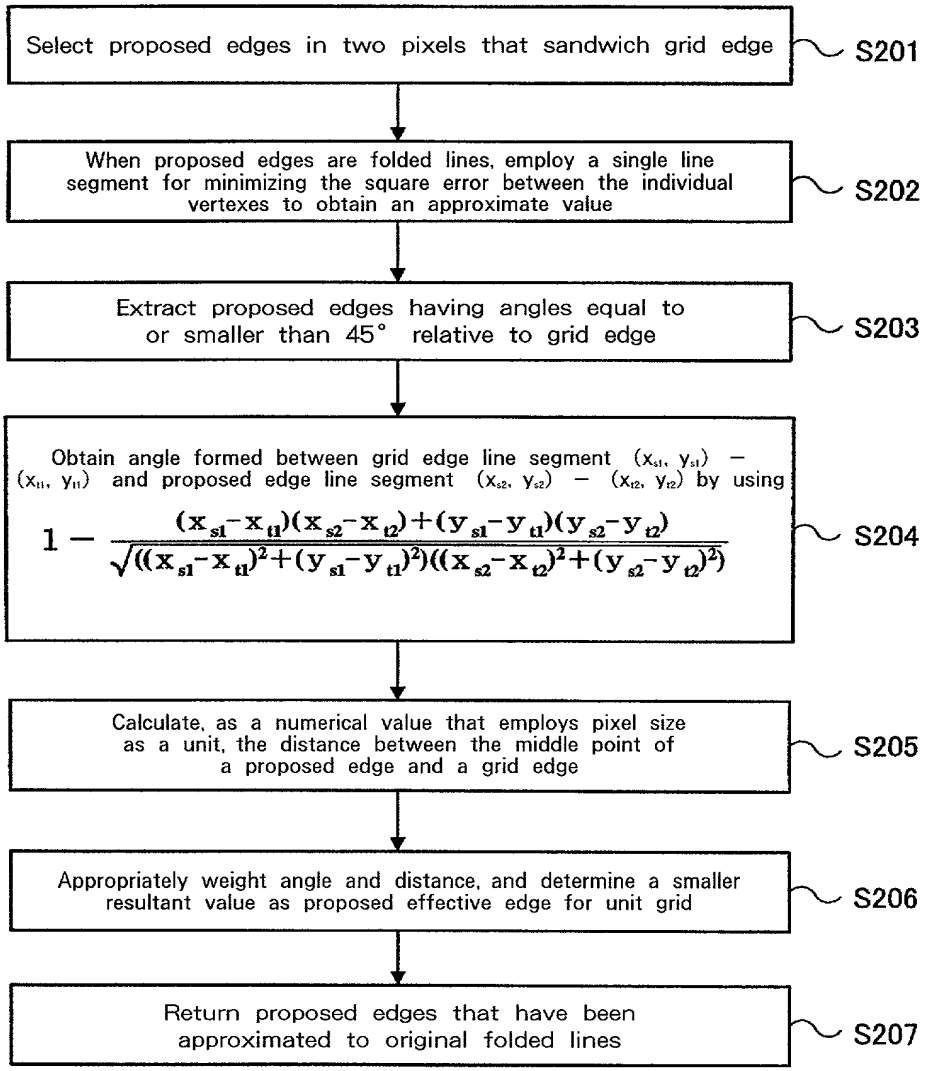


Fig. 11

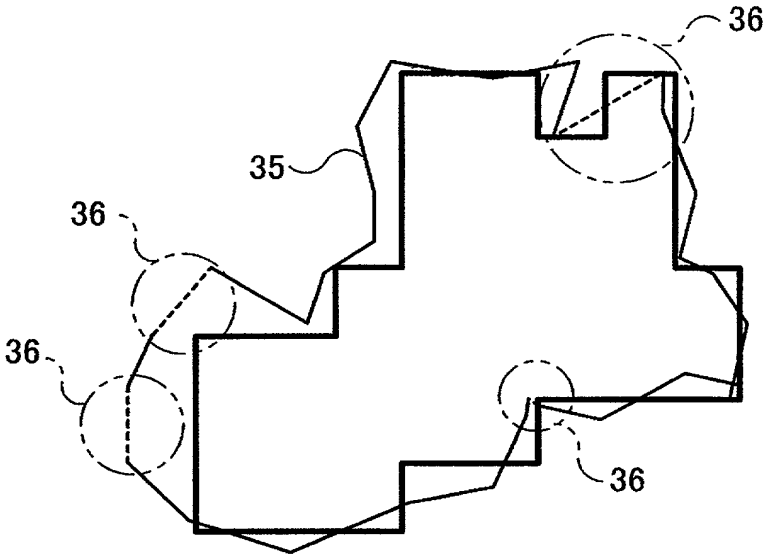


Fig. 12

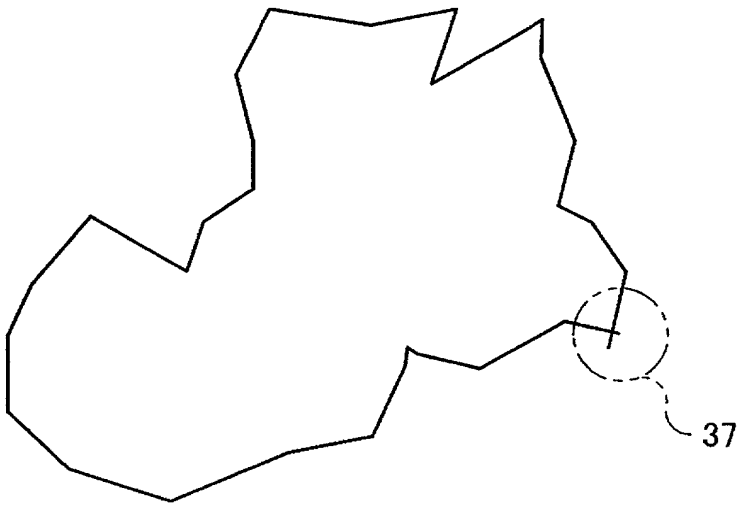


Fig. 13

JPO2000-0042

FOREIGN ESCAPE

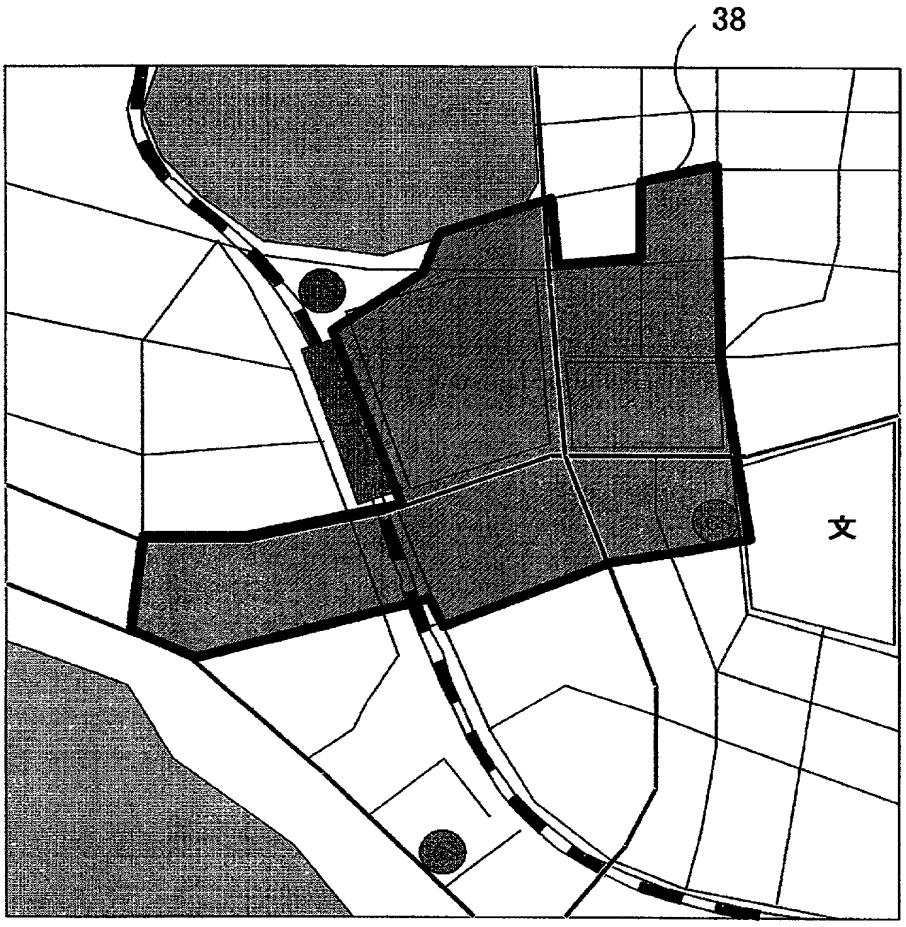


Fig. 14